

Claims

What is claimed is:

1. A kit for supporting a bodily passage in an open state, the kit comprising:
 - a. an expandable device including:
 - (1) one or more main channels, and
 - (2) subsidiary channels which each branch outwardly from at least one of the main channels,wherein the channels are expandable from:
 - i. a collapsed state wherein the device may be fit into the bodily passage, and
 - ii. an expanded state wherein the expanded channels define a framework which at least partially surrounds a portion of the interior of the bodily passage;
 - b. rigidifying material introducable into the channels in a fluid state, the rigidifying material then maintaining the channels in the expanded state.
2. The kit of claim 1 further comprising at least one inlet tube extending from the expandable device, each inlet tube opening onto at least one of the channels, whereby the rigidifying material may be introduced to the channels through the tube.
3. The kit of claim 1 wherein at least some of the channels of the expandable device are joined by webs of flexible material.
4. The kit of claim 1 wherein the channels define ridges on the exterior of the framework when the channels are in the expanded state.

5. The kit of claim 1 wherein the framework has at an least substantially tubular shape.
- 5 6. The kit of claim 1 wherein the framework has an at least substantially tubular shape with an interior device passage extending between opposing ends of the device, the interior device passage being:
- a. coincident with a portion of the interior of the bodily passage when the channels are in the expanded state, and
 - b. collapsed when the channels are in the collapsed state.
- 10 7. The kit of claim 1 wherein the device is sheetlike with opposing sides when in its collapsed state, with the device curving to situate the framework at least partially about the interior of the bodily passage when in its expanded state.
- 15 8. The kit of claim 1 wherein the channels of the expandable device have diameters which are less than the spacing between:
- a. any adjacent main channels, and
 - b. any adjacent subsidiary channels.
- 20 9. The kit of claim 1 wherein the rigidifying material changes from the fluid state to an at least partially nonfluid state.
- 25 10. The kit of claim 1 wherein the rigidifying material comprises at least two components wherein the components change from a fluid state to an at least partially nonfluid state after being combined.

11. The kit of claim 1 wherein the rigidifying material comprises at least one component selected from the following group:

- a. a polymerizable monomer; and
- b. a pre-polymer.

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12. The kit of claim 1 wherein the rigidifying material includes at least one of:

- a. epoxy resin;
- b. a silicon elastomer;
- c. a cyanoacrylate; and
- d. a methacrylate.

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13. A kit for supporting a bodily passage in an open state, the kit comprising:

- a. an expandable device including a plurality of channels, with at least some of the channels branching from others of the channels, the channels converting between:
 - i. a collapsed state wherein the channels are flexible to allow the device to fit into the bodily passage, and
 - ii. an expanded state wherein the channels define a rigid framework, with at least some of the channels within the framework being arrayed in spaced relation to at least partially surround a portion of the interior of the bodily passage;
- b. fluid material introducable into the channels, wherein the fluid material converts the channels between the flexible collapsed state and the rigid expanded state.

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14. The kit of claim 13 wherein at least some of the channels of the expandable device are joined by webs of flexible material.

15. The kit of claim 14 wherein the channels define ridges raised above the webs on the exterior of the framework when the channels are in the expanded state.

16. The kit of claim 13 wherein the framework has at an least substantially tubular shape when the channels are in the expanded state.

17. The kit of claim 13 wherein the device is sheetlike with opposing sides when in its collapsed state, with the device deforming to situate the framework at least partially about the interior passage when in its expanded state.

18. The kit of claim 13 wherein the channels of the expandable device have diameters which are less than the distances between the spaced channels.

19. The kit of claim 13 further comprising an inlet tube extending from at least one of the channels of the expandable device, whereby the fluid material may be introduced to the channels through the inlet tube.

20. The kit of claim 13 wherein the fluid material changes from the fluid state to an at least partially rigid state.

21. The kit of claim 13 wherein the fluid material comprises at least two components wherein the components change from a fluid state to an at least partially rigid state after being combined.

22. The kit of claim 13 wherein the fluid material comprises at least one component selected from the following group:

- a. a polymerizable monomer; and
- b. a pre-polymer.

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23. The kit of claim 13 wherein the fluid material includes at least one of:

- a. epoxy resin;
- b. a silicon elastomer;
- c. a cyanoacrylate; and
- d. a methacrylate.

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24. An expandable device for supporting a bodily passage in an open state, the device comprising a plurality of channels, with at least some of the channels branching from others of the channels, the channels converting between:

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- a. a collapsed state wherein the channels:
 - (1) are radially collapsed, and
 - (2) are flexible along their lengths,thereby allowing the device to fit into the bodily passage; and

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- b. an expanded state wherein the channels:
 - (1) are radially expanded with inflexible outer diameters, and
 - (2) are rigid along their lengths,with the channels thereby defining a rigid framework wherein at least some of the channels are arrayed in spaced relation to at least partially surround a portion of the interior of the bodily passage.

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25. The expandable device of claim 24 wherein the channels are converted from the collapsed state to the expanded state by rigidifying material fluidly situated in the channels, the rigidifying material hardening to fix the channels in the expanded state.
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26. The expandable device of claim 25 wherein the rigidifying material comprises at least two components wherein the components change from a fluid state to an at least partially nonfluid state after being combined.
27. The expandable device of claim 25 wherein the rigidifying material comprises at least one component selected from the following group:
- a. a polymerizable monomer; and
 - b. a pre-polymer.
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28. The expandable device of claim 25 wherein the rigidifying material includes at least one of:
- a. epoxy resin;
 - b. a silicon elastomer;
 - c. a cyanoacrylate; and
 - 20 d. a methacrylate.
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29. The expandable device of claim 24 further comprising at least one inlet tube, each inlet tube extending from at least one of the channels, whereby rigidifying material may be introduced through the tube and into the channels to convert the channels from the collapsed state to the expanded state.

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30. The expandable device of claim 24 wherein at least some of the channels are joined by webs of flexible material.
31. The expandable device of claim 24 wherein at least some of the channels define ridges on the exterior of the framework when the channels are in the expanded state.
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32. The expandable device of claim 24 wherein the device is sheetlike with opposing sides when in its collapsed state, with the device curving to at least partially surround a portion of the interior of the bodily passage when in its expanded state.
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33. The expandable device of claim 24 wherein the channels have diameters which are less than the spacing between:
- a. any adjacent main channels, and
 - b. any adjacent subsidiary channels.
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34. An expandable device for supporting a bodily passage in an open state, the device comprising:
- a. one or more main channels, and
 - b. subsidiary channels which each branch outwardly from at least one of the main channels,
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- wherein the channels are convertible from:
- (1) a collapsed state wherein the channels have flexible diameters and lengths, and the device may be fit into the bodily passage, and
 - (2) an expanded state wherein the channels have rigid diameters and lengths, and are spaced into a framework which at least partially surrounds a portion of the interior of the bodily passage.

35. The expandable device of claim 34 further comprising rigidifying material introducable into the channels in a fluid state, the rigidifying material then maintaining the channels in the expanded state.
- 5 36. The expandable device of claim 35 wherein the rigidifying material comprises at least two components wherein the components change from a fluid state to an at least partially nonfluid state after being combined.
- 10 37. The expandable device of claim 35 wherein the rigidifying material comprises at least one component selected from the following group:
- a. a polymerizable monomer; and
 - b. a pre-polymer.
- 15 38. The expandable device of claim 35 wherein the rigidifying material includes at least one of:
- a. epoxy resin;
 - b. a silicon elastomer;
 - c. a cyanoacrylate; and
 - d. a methacrylate.
- 20 39. The expandable device of claim 34 further comprising at least one inlet tube, each inlet tube extending from at least one of the channels, whereby rigidifying material may be introduced through the tube and into the channels to convert the channels from the collapsed state to the expanded state.
- 25 40. The expandable device of claim 34 wherein at least some of the channels are joined by webs of flexible material.

41. The expandable device of claim 34 wherein at least some of the channels define ridges on the exterior of the framework when the channels are in the expanded state.
- 5 42. The expandable device of claim 34 wherein the framework has an at least substantially tubular shape with an interior device passage extending between opposing ends of the device, the interior device passage being:
- 10 a. coincident with a portion of the interior of the bodily passage when the channels are in the expanded state, and
- b. collapsed when the channels are in the collapsed state.
- 15 43. The expandable device of claim 34 wherein the device is sheetlike with opposing sides when in its collapsed state, with the device curving to have the framework at least partially surround a portion of the interior of the bodily passage when in its expanded state.
- 20 44. The expandable device of claim 34 wherein the channels have diameters which are less than the spacing between:
- a. any adjacent main channels, and
- b. any adjacent subsidiary channels.

45. A method of supporting a bodily passage in an open state, the method comprising the steps of:
- 5 a. inserting an expandable device into the bodily passage, the device including:
- (1) one or more main channels,
- (2) subsidiary channels which each branch outwardly from at least one of the main channels, and
- (3) an inlet tube extending from the device and opening onto at least one of the channels,
- 10 wherein the channels are in a collapsed state allowing the device to be fit into the bodily passage;
- b. introducing a rigidifying material into the inlet tube in a fluid state at least until the channels reach an expanded state wherein the expanded channels define a framework which at least partially surrounds a portion of the interior of the bodily passage; and
- 15 c. thereafter removing at least a portion of the inlet tube from the device and the bodily passage.
46. The method of claim 45 further comprising the step of introducing rigidifying material into the inlet tube at least until the channels expand to define ridges on the exterior of the framework.
- 20 47. The method of claim 45 wherein the device is sheetlike with opposing sides when in its collapsed state, and further comprising the step of introducing rigidifying material into the inlet tube at least until the device curves to situate the framework at least partially about the interior of the bodily passage.
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48. The method of claim 45 further comprising the step of introducing rigidifying material into the inlet tube at least until adjacent ones of the channels are spaced apart with distances greater than the diameters of the channels.
- 5 49. The method of claim 45 further comprising the step of closing at least a portion of the inlet tube prior to removing the inlet tube from the device.
- 10 50. The method of claim 45 further comprising the step of allowing the rigidifying material to at least partially rigidify into a nonfluid state prior to removing the inlet tube from the device.
- 15 51. The method of claim 45 further comprising the step of introducing a rigidifying agent into the rigidifying material to cause the rigidifying material to at least partially rigidify into a nonfluid state.
52. The method of claim 45 wherein at least some of the channels of the expandable device are joined by webs of flexible material.
- 20 53. The method of claim 45 wherein the framework has at an least substantially tubular shape.

54. A method of supporting a bodily passage in an open state, the method comprising the steps of:
- a. providing an expandable device which includes a plurality of channels, with at least some of the channels branching from others of the channels;
 - b. fitting the device into the bodily passage when the expandable device is in a collapsed state wherein the channels are flexible;
 - c. introducing fluid material into the channels, wherein the fluid material converts the channels between the collapsed state into an expanded state, and wherein the channels in the expanded state define a rigid framework having at least some of the channels arrayed in spaced relation to at least partially surround a portion of the interior of the bodily passage.
55. The method of claim 54 wherein the fluid material is introduced into the channels by an inlet tube extending from the expandable device and opening onto at least one of the channels.
56. The method of claim 55 further comprising the step of removing at least a portion of the inlet tube from the device after the channels are converted to the expanded state.
57. The method of claim 55 further comprising the step of allowing the fluid material to at least partially rigidify into a nonfluid state prior to removing the inlet tube from the device.
58. The method of claim 54 wherein fluid material is introduced into the channels at least until the channels expand to define ridges on the exterior of the framework.

59. The method of claim 54 wherein the device is sheetlike with opposing sides when in its collapsed state, and wherein fluid material is introduced to the channels at least until the device curves to have the framework at least partially surround the interior of the bodily passage.

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60. The method of claim 54 wherein fluid material is introduced into the channels at least until adjacent ones of the channels are spaced apart with distances greater than the diameters of the channels.

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61. The method of claim 54 wherein the fluid material changes from the fluid state to an at least partially rigid state as the channels attain the expanded state.

62. The method of claim 54 further comprising the step of introducing a rigidifying agent into the fluid material to cause the fluid material to at least partially rigidify into a nonfluid state.

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